

argue that an Ass and a Horse are the same species, or a Zebra and Quagga, or *vice versa*.

The Japanese Pig breeds with facility with the common domestic Pig. We have not had time to observe whether the offspring is prolific. The half-breed of the Japanese Boar with a common Sow retains almost all the external characters of the male parent well developed. I have not yet had the opportunity of observing what effect the crossing has on the osteological characters of the species.

I think that no one who will take the trouble to compare the skulls of the different varieties of domestic Pigs which are usually found in England, with the skull of the European Wild Boars and the Wild Pigs of Asia and the Island, can doubt for a moment the derivation of the domestic breeds from the wild type*. Indeed, the change in form is so slight as to be scarcely perceptible, and the gradation between the most abnormal form to the wild animal so gradual as to be sufficient to show that even the most abnormal state is due only to a gradual change of form.

Mr. Eyton, in a paper printed in the 'Proceedings,' has shown that a Chinese Pig which he examined had a different number of vertebræ from another domestic Pig; but the skull of a Chinese Pig I have examined shows no characters to separate it from the Common Pig. Its head is a little shorter than usual, but not so short as that of a Berkshire Pig.

MISCELLANEOUS.

On the Arrangement of Natural-History Collections.

By L. AGASSIZ.

[THE following extract from the Report of Prof. Agassiz to the Senate and House of Representatives of the United States will prove interesting as giving the views of a distinguished naturalist upon a subject which has lately given rise to much discussion in connexion with our National Museum. Besides this, it will be found that the questions raised have led Prof. Agassiz to express certain opinions upon palæontological matters which cannot but be regarded as of high importance.]

Having given an account of the general plan of the Museum in a former Report, I propose now to lay before you the plan of the arrangement of that part of the collection which is nearly completed. I deem it the more important to explain it fully, as my experience with other museums has satisfied me that collections of natural history are less useful for study in proportion as they are more extensive.

This may seem paradoxical, yet it is undoubtedly true; for while the most extensive collections answer admirably the purposes of professional naturalists for special researches and original investigations, they are generally beyond the grasp of less advanced students, and

* See Bartlett, Proc. Zool. Soc. 1861, pp. 263, 264; Ann. and Mag. N. H. 1861, 501; 1862, 162.

cease to be instructive at all for the largest number of visitors of such establishments. In arranging our collections, which are intended at the same time to be instructive for the million and to afford the amplest material for any kind of scientific investigations, it has been my aim to combine these two objects; and as nothing of the kind has yet been attempted in any large museum, as far as I know, a detailed account of the plan, as adopted in our Museum, may be welcome to others. But as each class of animals requires a special treatment in a well-appointed museum, I propose, this year, to speak only of the arrangement of the Radiata, as these are the most advanced in our exhibition-rooms.

With the view of fostering the systematic study of these animals and laying before the students in the smallest possible space the best ascertained results respecting their affinities, in the present state of our science, I have arranged special systematic collections, intended solely to exhibit the natural affinities of the members of the several classes. These systematic collections embrace carefully chosen representatives of all the genera; but, with the view of making such collections as compact as possible, only one species of each genus has been introduced from each well-characterized zoological province, frequently to the exclusion of a large number of species which would only bewilder the student in his first attempt to master the natural affinities of the representatives of any given class. With this systematic collection are combined all the preparations intended to illustrate the structural characters of the genera, the peculiarities of form which distinguish the different families, the complication of structure characteristic of the orders, as well as the mode of execution of the structure of the class as a whole.

Next to the systematic collections, I have begun to make special faunal collections, chiefly intended to facilitate the study of the species and their geographical distribution. Thus removing from the systematic collection everything which relates to the study of species, I hope to impress upon our students more forcibly than is generally the case the real importance of a proper investigation of the various degrees and different kinds of affinities which bind all animals into a great systematic whole. These faunal collections have another advantage; they bring distinctly before the eye the character of the inhabitants of different parts of the world in their natural combinations, and that in a far more impressive manner than can possibly be attained by a mere nominative enumeration of species. To add to the interest of these faunal collections, I have placed here everything that may illustrate the peculiarities of the species, and have therefore taken care that they should embrace large numbers of specimens in every possible state of growth. The attempt at arranging these collections has already convinced me of their great importance. Our knowledge of the range of the natural faunæ is very imperfect; and I have found it impossible to adopt, without modifications, any of the proposed divisions of the earth's surface into zoological provinces. The divisions thus far proposed show plainly that they were circumscribed by physical considerations, and not by the special study of

the range and distribution of the animals themselves. However, by the very attempt to place side by side, in a methodical order, all the representatives of adjoining faunæ, I have gradually been led to define more accurately the natural limits of the faunæ themselves. It is surprising to me that the principle by which faunæ may be defined has not yet been stated, although it is very simple. It may thus be expressed: the geographical range of representative species occupying adjoining regions marks the natural boundaries of their respective fauna.

Since in our days it is no longer possible to study the animal kingdom without including in the investigation the remains of past geological ages, the question has naturally arisen, what disposition to make of the fossils. After mature consideration, I have come to the conclusion, that for their most suitable arrangement it was indispensable to make also two kinds of collections of the fossil remains. In one of them, which corresponds to the systematic collection of the living animals, they are arranged systematically, according to the natural affinities of the different representatives of each geological period, in such a manner that the zoological character of these epochs is shown as distinctly to the eye of the student as the character of the present creation, by the study of the systematic collection of the living animals. With the aid of these collections, special zoological treatises of each period may be compiled without difficulty; and I have already satisfied myself that a comparison of those collections furnishes much information respecting the true affinities of animals.

The second kind of collections of fossils is arranged in a way which corresponds to the faunal collections of living animals,—that is to say, according to their geographical distribution during each successive geological epoch. This arrangement has enabled me to display by themselves the more extensive collections of fossils, obtained from particular localities, in their characteristic mode of association, without crowding them upon the attention of the beginner, or giving them, by their larger number, an undue preponderance in the collection of the epoch to which they belong. But there is another advantage in making special faunal collections of fossils: they suggest comparisons with the faunæ of the present time, which could not otherwise be made so effectively. Thus far geologists, in identifying the horizons of the successive deposits forming the stratified crust of our globe, have started from the universally accepted assumption that animals of the same geological age are either identical or closely allied over the most extensive areas. Nothing can be further from the truth than such a view; and we need only to compare the faunæ of the present period in remote continents, to see how widely these differ. If the remains of past ages, belonging to the same geological periods, have generally appeared to be identical or closely allied, it is chiefly owing to the fact that they have been collected in the same geographical zones; and at present we find a similar agreement between the living animals of the temperate zone of Europe, Asia, and North America. But when we pass to other zones, the scene is entirely changed; and so it was in former ages, as we already know from the

tertiary mammalia of South America and of Australia ; and this, I have no doubt, will be found to be also the case for the older formations, within certain limits, not yet ascertained. The specific differences between the remains of the same age, found in deposits remote from each other, are daily brought out more distinctly ; and since I have begun to compare the fossils of America with those of Europe, I am gradually led to infer that no specific identity is likely to be established, finally, between animals which have lived at great distances from one another, even though they were contemporaries. The doctrine of the identity of fossils of the same age will therefore require great modifications. I am already certain that species of the same family, belonging to different epochs, but found in corresponding zones of latitude, are frequently much more closely allied than species of the same age belonging to different zones. The time is therefore fast approaching when zoological affinity alone will no longer be a trustworthy criterion of contemporaneity, nor zoological difference, however striking, be taken as evidence of a difference in geological age. This unexpected and probably to many most unwelcome result I have obtained by a careful comparison of many faunæ of past ages, arranged in the manner above indicated. If this should render the identification of rocks, by the aid of the fossils they contain, more difficult for those not very familiar with zoology, it will, on the other hand, afford most instructive evidences of the successive changes the animal creation has undergone upon different parts of the earth's surface, at different periods, and show how, in earlier ages, combinations of living beings existed in certain parts of the globe, quite distinct from those now occupying the same localities, and yet quite similar to those existing at the present time in other regions. I need only allude to the similarity of some of the extinct faunæ of the jurassic period to the living fauna of Australia, to make this statement clear ; and similar resemblances may be traced between the extinct faunæ of other periods and the living faunæ of other parts of the world. As one instance already pointed out, on another occasion, I may allude to the resemblance of the extinct fauna and flora of Oeningen with that of the temperate zone of the Atlantic States of North America.

A third kind of collections embraces everything that may illustrate the mode of reproduction, and the embryonic growth of each class. Here are placed together eggs and embryos in various stages of development, and young animals which have not yet completed their growth and assumed their specific characteristics. But these collections do not include the preparations intended to illustrate the organs of reproduction themselves, as characteristic of the different families in the adult state ; these are referred to the general systematic collection.

An objection may perhaps be made to such an arrangement of a museum, as requiring a larger number of specimens than are generally exhibited in a systematic collection, embracing in one series the whole animal kingdom. It would certainly be a great mistake to neglect these multiplied modes of instruction, even were it true that they en-

tail the necessity of preserving a larger number of specimens, and may lead to some waste of room. I am satisfied, however, that with a proper attention in the selection of the specimens intended as representatives of the genera in the systematic collection, no unnecessary repetitions need be made. I have been careful everywhere to avoid the introduction of large specimens in the systematic collection, in order to render them more comprehensive, and to bring, at a glance, a whole class under the eye; while the bulk of specimens illustrating the species are referred to the faunal collections. And I need not repeat here what I have stated again and again on other occasions, that the great deficiency of other museums, and especially of the large public collections, consists in the scanty representation of the species and the monotony with which a single male and female, or sometimes even a single specimen, are allowed to be the only provision made for the study of an animal which, to be well known, ought to be examined in an ample series of specimens of all ages, of both sexes, and in every possible state of preservation. What are frequently called characteristic specimens, and paraded singly as types, are but too often thus set aside by unscientific keepers of museums, in order that they may have an opportunity of disposing of other specimens for exchanges, and thus increasing the nominal number of the species in their collections.

On a New Genus of Lizards from Ceylon.

By W. PETERS.

COPHOTIS, nov. gen.*

By its compressed form, the equal number of its fingers and toes, and its concealed tympanum, this genus of *Iguanoidea* approaches the Ceylonese genera *Otocryptis*, *Lyriocephalus*, and *Ceratophora*. It is readily distinguished from them by the extremely fine granulation and keelless texture of the soles of all the feet, by the nearly equal length of the third and fourth toes, by the comb of scales, which extends along the whole length of the back, by the large scales of the tail, and the more produced form of the muzzle. It agrees most closely with *Ceratophora* by the larger scales on the sides of the throat, the neck, and the body, and with *Lyriocephalus* in its occipital spine and small postocular spine.

Cophotis ceylanica, n. sp.

The head is pyramidal, twice as long as its breadth and height; the muzzle is equal in length to the distance between the eyes. The round nostrils open laterally in simple shields, which stand in immediate connexion with the supralabial shields, and are separated from the rostral shield by one or two, and from each other by three series of convex scales. Regular, keeled scales, pretty nearly equal in size to those occurring on the muzzle, form a supraorbital arch on each side; this consists of seven scales, and applies itself to the post-orbital spine. The supraorbital arches are separated from each

* From κωφός, weak; οὖς, ὠτὸς, ear.